

Understanding the Enemy as a Complex System

A Multidisciplinary Analytic Problem Requiring a Multidisciplinary Team Approach

D. LEE FUELL JR., DEFENSE INTELLIGENCE SENIOR LEADER, USAF

Our greatest challenge today is to identify and understand the enemy we need to affect.

—Lt Gen David A. Deptula
Deputy Chief of Staff for
Intelligence, Surveillance,
and Reconnaissance
Headquarters US Air Force



THE AIR FORCE'S intelligence, surveillance, and reconnaissance (ISR) strategy requires the Air Force ISR enterprise to understand current and potential enemies as a system—a complex “organism” dependent on leadership, people, resources, infrastructure, defenses, the environment in which it operates, and myriad other factors that determine war-fighting capabilities and vulnerabilities.¹ Understanding the adversary as a complex system requires comprehensive knowledge well beyond order of battle and disposition of forces; moreover, it is fundamental to an effects-based approach to operations.² This knowledge allows US strategists and operational planners to predict enemy behavior and select means of attack that achieve maximum effect with maximum efficiency, whether the desired effect is to influence or to destroy.³ Without comprehensive knowledge of the enemy, armed conflict can degenerate into an extended, bloody, and expensive war of attrition.

Developing such an understanding of foreign air and space forces as complex systems is the responsibility of the National Air and Space Intelligence Center's Global Threat Analysis Group (NASIC/GTG), whose mission is to deliver predictive intelligence on global integrated capabilities across the air, space, and information domains.⁴ GTG analysts are charged with synthesizing intelligence data and other intelligence assessments from across the breadth of “Boyd’s Trinity” of “people first, ideas second, and things third” into cohesive and coherent assessments of foreign air and space war-

Report Documentation Page			<i>Form Approved OMB No. 0704-0188</i>	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE 2009	2. REPORT TYPE	3. DATES COVERED 00-00-2009 to 00-00-2009		
4. TITLE AND SUBTITLE Understanding the Enemy as a Complex System: A Multidisciplinary Analytic Problem Requiring a Multidisciplinary Team Approach		5a. CONTRACT NUMBER		
		5b. GRANT NUMBER		
		5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)		5d. PROJECT NUMBER		
		5e. TASK NUMBER		
		5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Research Institute (AFRI),155 N Twining Street,Maxwell AFB,AL,36112		8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)		
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 6
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified		

fighting capabilities and vulnerabilities, from tomorrow to as far as 20 years in the future.⁵ As the technical director for global threat, I provide senior oversight and guidance to the group's analysis and production—analysis as intellectually challenging as graduate-level research and production that generates assessments on par with master's theses and, occasionally, PhD dissertations, and sometimes more so. In some cases, the breadth and depth required,

In the GTG, we challenge our analysts of air and space force employment to “think like a foreign general officer.”

combined with the need to deal with active denial and deception by the enemy whom the analysts seek to understand, surpass any level of academic research in difficulty and complexity.⁶

Assessing an adversary as a complex system is a daunting analytic task, fraught with numerous organizational and behavioral challenges and requiring extensive expertise in multiple disciplines. This article examines two of those challenges—analyst expertise and teamwork—and recommends changes that the Air Force's ISR leaders can consider to overcome them.

★ ★ ★ ★ ★

To improve analysis, we need better analysts.

—Dr. Thomas Fingar
Former Deputy Director
of National Intelligence
for Analysis

Analysis of foreign integrated air and space war-fighting capability—developing that understanding of the adversary as a complex system—requires a breadth and depth of expertise difficult for a single individual to obtain. A country's ability to employ air and space forces is affected by diverse factors including, but not limited to, strategy, doctrine, training, national and organizational culture, morale, or-

der of battle, logistics, maintenance, intelligence, geography, and any number of other tangible and intangible influences. Some of the tangible factors, like weapon-system performance and order of battle, lend themselves well to objective analysis based on the sciences and engineering. Others, like human motivations and intentions, are “fuzzier” and require different, less-well-defined skill sets to assess. In the GTG, we challenge our analysts of air and space force employment to “think like a foreign general officer”—a concept difficult to grasp for many junior- and midlevel military and civilian analysts who lack the experience and skill sets of a joint force air component commander.

The Air Force ISR enterprise, well manned with analysts skilled in the sciences and engineering, has an excellent track record of scientific and technical intelligence analysis of foreign weapon system (and “system of systems”) capabilities and limitations (Boyd's “things”). Formal education opportunities in the sciences and engineering abound, and the Air Force makes good use of both active duty and civilian scientists and engineers to do this kind of analysis. Expertise in the hard sciences alone, though necessary, is not sufficient to develop the required understanding of enemy forces as a complex system—we must also understand the less objective, more human-centered factors (Boyd's “people” and “ideas”). Unfortunately, opportunities for formal education in the art of employing air and space forces are not as readily available as those in the hard sciences. Although Air University's Air Command and Staff College (ACSC) awards an accredited master's degree in military operational art and science (including a course in research and analysis methodology) to its graduates, military officers attend ACSC as majors for the most part.⁷ By the time intelligence officers have been formally educated in the theory, principles, and practices of employing air and space forces, as well as critical thinking and analysis, career development dictates that they move out of analysis and into leadership positions. Without a change in our career-development mind-set, the skills and

knowledge that officers develop at ACSC cannot be directly applied to intelligence analysis.

Opportunities exist for civilian analysts to attend ACSC in residence and earn a degree, but those opportunities are not sufficient to educate all of the analysts required by the mission. Fortunately, the Air Force has an enlightened enrollment policy for nonresident developmental education that allows midlevel civilian analysts to complete ACSC via distance learning. Though not as beneficial as the in-residence program, nonresident ACSC at least provides a structured education in the theory, principles, and practices of the operational art of employing air and space forces.

Perhaps more important than formal education is actual experience at planning and employing air and space forces at the operational level of war. This experience is even harder to come by than education, but a prior assignment or rotational detail in an air operations center's (AOC) strategy or combat plans division would be a plus for an analyst charged with assessing an enemy's integrated air and space war-fighting capability. Unfortunately, the same career-development factors cited above complicate the use of experienced planners as intelligence analysts.

Expertise in air and space operational art, though necessary, is not sufficient. Predicting enemy behavior also requires extensive knowledge of subjects as diverse as international affairs, foreign policy, culture, religion, sociology, and a host of other factors.⁸ The knowledge required to attempt complex system analysis of an enemy far exceeds what we can reasonably expect an individual to master, driving us to the need for multidisciplinary analytic teams.

Actions the Air Force can take to improve the individual expertise of analysts tasked with developing understanding of the enemy's air and space war-fighting capability as complex systems include the following:

- Changing the paradigm for the career development of intelligence officers to value post-ACSC and/or post-AOC service as an analyst, providing that analysis focuses on the operational level of war.

- Increasing the emphasis on nonresident ACSC, or similar developmental education that emphasizes operational art, as part of the individual development plan for midlevel civilian analysts, providing increased on-duty time and resources to do the course work.
- Increasing emphasis on, and funding for, graduate-level study in other disciplines required to establish in-depth knowledge of adversaries as complex systems.
- Establishing opportunities for rotational assignment or extended temporary duty for intelligence analysts in an AOC's strategy and combat plans divisions to provide them at least an exposure to the complexities of employing air and space forces.
- Actively recruiting retired officers with operational war-fighting experience as civilian analysts of air and space force employment, and reforming civilian hiring practices and compensation to make such employment more attractive.
- Leveraging the experience of Air Force senior mentors to assist with developing analysts' expertise in air and space operational art.



We've got a lot of smart people, but none of them are smart enough by themselves to adequately address the array of very complex, fast-moving issues that we're asked to analyze.

—Dr. Thomas Fingar
Former Deputy Director
of National Intelligence
for Analysis

Building knowledge requires a team.

—Lt Gen David A. Deptula
Deputy Chief of Staff for
Intelligence, Surveillance,
and Reconnaissance
Headquarters US Air Force

No matter how well we develop individual expertise in analysts charged with developing the understanding of our adversaries as com-

plex systems, the challenge remains too broad and deep for a single individual to accomplish on his or her own. As the Air Force's ISR strategy correctly notes, mastery of such complex problems becomes possible only through the actions of high-performing teams.⁹ Comprehensive analysis of enemy forces requires not only the broad, "big picture" perspective of analysts schooled and experienced in operational art, but also the in-depth knowledge of analysts more tightly focused on the constituent components of overall war-fighting capability. It is not simply a matter of aggregating separate assessments of the constituent components; the synergy between breadth and depth obtained by the dynamic interaction of analysts who bring expert knowledge from multiple disciplines with different perspectives working

The ability to function as a team player and to put team accomplishment ahead of individual accomplishment is an essential attribute of an intelligence analyst in today's Air Force ISR enterprise.

toward a common goal produces insight not obtainable by single analysts working alone. Also, research indicates that reasoning by groups with different pools of knowledge modulates individual bias and prevents errors in individual reasoning, producing higher-quality judgments than simple aggregation.¹⁰ All things considered, the ability to function as a team player and to put team accomplishment ahead of individual accomplishment is an essential attribute of an intelligence analyst in today's Air Force ISR enterprise.

Unfortunately, our performance-evaluation processes (for officers, enlisted members, and civilians) tend to be based more on individual rather than team accomplishment. Raters are frequently reminded to describe actions and their effects in appraisals that value *individual* action verbs like "led" or "discovered" or "implemented" more highly than more amorphous phrases such as "key member of." We stratify our *individuals*: "my no. 1 captain of 20" is a highly desirable appraisal bullet. Our awards and decorations process is also biased toward individual accomplishment; awards for team accomplishment are not valued as highly as those for individuals. Do any of us believe that any Air Force member would rather have an Outstanding Unit Award than a Meritorious Service Medal? In this culture, it is not surprising that many analysts would rather work individually than as team members on broad, multidisciplinary analyses of overall integrated war-fighting capability. Asking our analysts to emphasize teamwork while evaluating and rewarding them for individual excellence sends a mixed message that leaders must strive to overcome. At worst, such a message can result in a "self before service" mind-set in analysts more motivated by personal advancement than mission success. Air Force ISR needs high-performing individuals in order to have high-performing teams, but ISR leaders need to do more to encourage and reward participation in analytic teams—formal or informal, top-down driven or bottom-up self-synchronized, or anything in between.

Intelligence-analysis organizations like NASIC are often functionally organized, with suborganizations grouped by analytic discipline (e.g., grouping all fighter-aircraft analysts into a single flight). However, the task of understanding the enemy as a large-scale system does not bin well into a unidisciplinary organizational element. All organizations develop unique identities and cultures, and if a unidisciplinary suborganization becomes insular and inwardly focused, it undermines the ability of the larger organization to form high-performing multidisciplinary teams that cross organizational boundaries. A contributing factor to this insularity is the desire for "credit" for work done—analysts and their leaders may perceive that they will receive less credit for their work as members of a multidisciplinary team than for more narrowly focused work performed within their "box" on the unit's organization chart. A functional organizational structure has great benefit for training and equipping intelligence analysts to perform a specific ana-

lytic task within a discipline, but that discipline alone will rarely prove sufficient to understand the enemy as a complex system.

An “ownership” mentality with regard to a suborganization’s mission can also emerge as an unintended consequence of a functional organizational structure. Such a mentality can manifest itself as reluctance to share knowledge, reticence toward participating in teams, resentment of other analysts’ mentioning “their” subject in a product, or any of a number of other antiteamwork pathologies. In reality, analysis missions overlap and are interdependent; it is neither possible nor desirable for an analyst or leader to claim sole ownership of a topic. Instead, analysts and leaders must embrace the concept of mission overlap and interdependency in order to make high-performance teams possible. In fact, some degree of overlap is necessary to provide the common perspective and purpose that analytic teams need in order to work broad, complex problems successfully; leaders should not view this necessary overlap as duplication.¹¹ Ultimately, analysts and their leaders should think of themselves as *stewards* of their mission and knowledge, not owners. We should also learn to think of functional organizations as capability providers to multidisciplinary teams for their area of expertise, much as we have learned to view the individual services as capability providers to the joint combatant commands. Analysts may be “ADCON” (administrative control) to functional organizations, but “OPCON” (operational control) to cross-functional, multidisciplinary integrated analysis teams formed to solve complex, large-scale intelligence problems.

The Air Force’s ISR strategy for 2008 addresses these challenges by emphasizing cross-organizational information sharing and the need to foster multidimensional leaders.¹² The ISR strategy calls on us to favor sharing too much information over sharing too little, but for years the intelligence community has marched to the drum of “need to know.” Transitioning from a “need to know” to a “responsibility to share” mind-set represents a major cultural change for experienced intelligence professionals, with all the attendant leader-

ship challenges. The ISR strategy also calls on us to “reserve our leadership positions for those who demonstrate the ability to lead teams to create knowledge” and identifies our most valuable people as “those who successfully lead cross-domain, cross-discipline teams

Ultimately, analysts and their leaders should think of themselves as stewards of their mission and knowledge, not owners.

to create actionable knowledge.”¹³ In addition to increasing the emphasis on team *leadership*, in order to field high-performance teams, we must do the same for team *membership*. If we fail to value and reward participation on teams as highly as individual accomplishment, team achievement will continue to be less valued than individual achievement.

Realizing the vision of the Air Force’s ISR strategy will require some significant changes to the way we evaluate and reward our people and the way we organize for and perform intelligence analysis. Some recommendations include the following:

- Increasing the emphasis on collaboration and team performance in training programs for all ISR analysts.
- Requiring a team-performance element on all performance plans for civilian analysts and emphasizing team accomplishments on performance appraisals.
- Issuing guidance to raters to emphasize team leadership and team accomplishment on performance reports for officers and enlisted members.
- Issuing guidance to promotion boards to value team leadership and team performance as highly as, if not more than, individual accomplishment.
- Increasing the number and type of ISR awards for team accomplishment and

perhaps decreasing those for individual accomplishment.

- Concerning ourselves less with credit for mission accomplishment and more with mission accomplishment itself.
- Formally defining functional organizations as “capability providers” to cross-functional analysis teams.
- Establishing integrated analysis teams as the norm, not the exception, for Air Force ISR analysis and giving those teams OPCON of analysts required to perform their assigned task(s).

★ ★ ★ ★ ★

Dominating capabilities . . . will not evolve from the skills, institutions and platforms of the past. They demand a uniquely trained, equipped, integrated, and empowered enterprise.

—Lt Gen David A. Deptula
Deputy Chief of Staff for
Intelligence, Surveillance,
and Reconnaissance
Headquarters US Air Force

The threats and challenges that the Air Force will continue to face in the twenty-first century are diverse and complex; deterring and defeating them will require an unprecedented depth and breadth of understanding of and capability to predict and influence adversaries’ capabilities, limitations, and intentions. The Air Force’s ISR strategy provides the overall guidance and philosophy for developing that understanding; this article has identified some of the personnel and institutional challenges to implementing that strategy and recommends actions that ISR leaders can take to overcome them. Clinging to the skills, processes, and rigid organizational structures of the industrial age is a recipe for failure in the information age: we will fail to sufficiently understand our enemies and anticipate their actions, allowing them to fight us on *their* terms, to *our* detriment. We need greater depth and breadth of expertise and more flexible and adaptable organizational constructs, necessitating fundamental changes in our sight picture of how we do intelligence analysis and whom we select to do it. □

Notes

1. Lt Gen David A. Deptula, *Lead Turning the Future: The 2008 Strategy for United States Air Force Intelligence, Surveillance and Reconnaissance* (Washington, DC: Headquarters US Air Force, 4 July 2008), 8, <http://www.af.mil/shared/media/document/AFD-081201-007.pdf>.

2. Air Force Doctrine Document 2, *Operations and Organization*, 3 April 2007, 19, <http://www.fas.org/irp/doddir/usa/afdd2.pdf>.

3. Deptula, *Lead Turning the Future*, 8–9.

4. Global Threat Analysis Group (NASIC) mission statement.

5. For “Boyd’s Trinity,” see Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington, DC: Smithsonian Institution Press, 2001), 110.

6. Bonnie Wilkinson, 711 HPW/RHCS, Wright-Patterson AFB, OH, interview by the author, 10 September 2008.

7. Col Tomislav Ruby, AF/A2DD, to the author, e-mail, 27 October 2007; and “Welcome to the Air Command and Staff College,” <http://www.au.af.mil/au/acsc/aboutACSC.asp>.

8. Wilkinson, interview.

9. Deptula, *Lead Turning the Future*, 10.

10. Kevin Dunbar, “How Scientists Really Reason: Scientific Reasoning in Real-World Laboratories,” in *Creative Thought: An Investigation of Conceptual Structures and Processes*, ed. Thomas B. Ward, Steven M. Smith, and Jyotsna Vaid (Washington, DC: American Psychological Association, 1997), 461–93.

11. Wilkinson, interview.

12. Deptula, *Lead Turning the Future*, 9.

13. *Ibid.*, 9, 10.